DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF AIR POLLUTION CONTROL
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor, Nashville, TN 37243
Telephone: (615) 532-0554, Email: Air.Pollution.Control@TN.gov

NON-TITLE V PERMIT APPLICATION
FACILITY IDENTIFICATION

Type or print and submit. Attach appropriate source description forms.

SITE INFORMATION

1. Organization's legal name and SOS control number [as registered with the TN Secretary of State (SOS)]
Sterilization Services of Tennessee - SOS# 029-949

2. Site name (if different from legal name)
Sterilization Services of Tennessee - Plant 2

3. Is a construction permit application fee being submitted? Yes [✓] No [ ]
(see instructions for appropriate fee to submit)

JUN26 12:32PM

4. Site address (St./Rd./Hwy.)		County name
4140 B. F. Goodrich Boulevard, Suite 200		Shelby
City	Zip code	**5.** NAICS or SIC code
Memphis	38118	

6. Site location (in lat. /long.)	Latitude	Longitude
	35 deg, 02 min, 04 sec	89 deg, 55 min, 09 sec

CONTACT INFORMATION (RESPONSIBLE PERSON)

7. Responsible person/Authorized contact			Phone number with area code
Timothy Connor			804-929-5422
Mailing address (St./Rd./Hwy.)			Fax number with area code
5674 Eastport Blvd			804-236-2497
City	State	Zip code	Email address
Richmond	VA	23231	dconnor@sterilization-services.com

CONTACT INFORMATION (TECHNICAL)

8. Principal technical contact			Phone number with area code
Steven Siler			847-420-4054 (mobile)
Mailing address (St./Rd./Hwy.)			Fax number with area code
350 Barclay Blvd			847-634-2627
City	State	Zip code	Email address
Lincolnshire	IL	60069	ssiler@altaircorp.net

CONTACT INFORMATION (BILLING)

9. Billing contact			Phone number with area code
Gaary Tracy			847-634-9540 extension 104
Mailing address (St./Rd./Hwy.)			Fax number with area code
350 Barclay Blvd			847-634-2627
City	State	Zip code	Email address
Lincolnshire	IL	60069	gtracy@altaircorp.net

AIR CONTAMINANT SOURCE(S) INFORMATION

10. Description of air contaminant source(s) and Unique Source ID(s). List, identify, and briefly describe process emission sources, fuel burning installations, and incinerators that are contained in this application and include a Unique Source ID for each source. The Unique Source ID is a name/number/letter, which uniquely identifies the air contaminant source(s), like Boiler #1, Paint Line #1, Engine #1, etc. (see instructions for more details)

See Attachment A - Ethylene Oxide Gas Sterilization Process Description
See Attachment B - Block Diagram with Ethylene Oxide Rates

CH1 - Sterilization Chamber 1
CH2 - Sterilization Chamber 2
CH3 - Sterilization Chamber 3
CH4 - Sterilization Chamber 4
CH5 - Sterilization Chamber 5

AR1 - Aeration Room 1
AR2 - Aeration Room 2
AR3 - Aeration Room 3
AR4 - Aeration Room 4

11. Is the air contaminant source(s) in a nonattainment area? If "Yes", then minor source BACT must be addressed. Yes ☐ No ☑

12. Normal operation:	Hours/Day 24	Days/Week 7	Weeks/Year 50	Days/Year 350
13. Percent annual throughput	Dec. – Feb. 25	March – May 25	June – August 25	Sept. – Nov. 25

TYPE OF PERMIT REQUESTED (check appropriate box)

14. Operating permit ☐	Date construction started	Date completed	Date of ownership change (if applicable)
	Last permit number(s)	Emission Source Reference Number(s)	
Construction permit ☑	Last permit number(s)	Emission Source Reference Number(s)	

If you chose Construction permit above, then choose either New Construction, Modification, or Location Transfer

New Construction ☑	Starting date 10/1/2019 - Expected	Completion date 11/1/2020 - Expected
Modification ☐	Date modification started or will start	Date completed or will complete
Location Transfer ☐	Transfer date	Address of last location

15. Describe changes that have been made to this equipment or operation(s) since the last construction or operating permit application:

New construction

16. Comments

SIGNATURE

Based upon information and belief formed after a reasonable inquiry, I, as the responsible person of the above mentioned facility, certify that the information contained in this application is accurate and true to the best of my knowledge. As specified in TCA Section 39-16-702(a)(4), this declaration is made under penalty of perjury.

17. Signature (application must be signed before it will be processed)	**Date**
Steven Siler Digitally signed by Steven Siler Date: 2019.06.25 14:01:47 -05'00'	6/25/2019

Signer's name (type or print)	**Title**	**Phone number with area code**
Steven Siler	COO	847-4204054

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NON-TITLE V PERMIT APPLICATION
EMISSION POINT DESCRIPTION

Type or print and submit for each stack or air contaminant source. Submit with the APC 100.

GENERAL IDENTIFICATION AND DESCRIPTION

1. Organization's legal name and SOS control number [as registered with the TN Secretary of State (SOS)]
Sterilization Services of Tennessee - SOS# 029-949

2. Unique Source ID (name/number/letter which uniquely identifies this air contaminant source, like Boiler #1)

3. Unique Emission Point ID (name/number/letter which uniquely identifies this emission point, like Stack #1)
EP1 - Scrubber Stack #1

4. Brief description of air contaminant source (Attach a diagram if appropriate):
See attachment B - EO gas removed from the chambers is vented to wet acid scrubber whose output is further vented to a dry bed reactor. The output of the dry bed reactor is vented to EP1 - Scrubber Stack #1

5. Emission point location	Latitude	Longitude	**6. Distance to nearest property line (Ft.)**
	35 deg, 02 min, 04 sec	89 deg, 55 min, 09 sec	not yet known but approximately 200 ft

STACK AND EMISSION DATA

7. Stack or emission point data: →	Height above grade (Ft.)	Diameter (Ft.)	Temperature (°F)	% of time over 125°F	Direction of exit (Up, down or horizontal)
	75	0.5	75	0	Up

Data at exit conditions: →	Flow (actual $Ft.^3$/Min.)	Velocity (Ft. /Sec.)	Moisture ($Grains/Ft.^3$)	Moisture (Percent)
	150 expected	150 expected	not yet known	not yet known

Data at standard conditions: →	Flow (Dry std. $Ft.^3$/Min.)	Velocity (Ft. /Sec.)	Moisture ($Grains/Ft.^3$)	Moisture (Percent)
	150 expected	150 expected	not yet known	not yet known

8. Monitoring device and recording instrument (check all that apply):

Opacity monitor	SO_2 monitor	NO_x monitor	Strip chart	Electronic data logger	Other (specify in comments)	No monitor (none)
☐	☐	☐	☐	☐	☐	☑

9. Control device. Description of proposed monitoring, recordkeeping, and reporting to assure compliance with emission limits. Include operating parameters of control device (flow rate, temperature, pressure drop, etc.).
glycol concentration
scrubbing liquor level
pH
tower temperature
reactor tank temperature
dry bed temperature

10. Air contaminants. Emission estimates for each air contaminant emitted from this point should be based on stack sampling results or engineering calculations. Calculations should be attached on a separate sheet. (see instructions for more details)

Air contaminants	Average Emissions (Lbs./Hr.)	Maximum Emissions (Lbs./Hr.)	Concen-tration	Average Emissions (Ton/Yr.)	Potential Emissions (Ton/Yr.)	Emissions Estimation Method Code *	Control Devices *	Control Effi-ciency %
Particulate matter (PM)			**					
Sulfur dioxide (SO_2)			***					
Carbon monoxide (CO)			PPM					
Volatile organic compounds (VOC)			PPM					
Nitrogen oxides (NO_X)			PPM					
Hydrogen fluoride (HF)								
Hydrogen chloride (HCl)								
Lead (Pb)								
Greenhouse gases (CO_2 equivalents)								
Hazardous air pollutant (specify) ethylene oxide	0.01	0.03		0.04	0.12	2	002	99+
Hazardous air pollutant (specify)								
Hazardous air pollutant (specify)								
Hazardous air pollutant (specify)								
Hazardous air pollutant (specify)								
Other (specify)								
Other (specify)								
Other (specify)								
Other (specify)								

11. Comments

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12. Signature		**Date** 6/4/2019
Signer's name (type or print)	**Title**	**Phone number with area code**

* Refer to the tables in the instructions for estimation method and control device codes.

** Exit gas particulate matter concentration units: Process – Grains/Dry Standard Ft^3 (70^0F), Wood fired boilers - Grains/Dry Standard Ft^3 (70^0F), all other boilers – Lbs. /Million BTU heat input.

*** Exit gas sulfur dioxide concentrations units: Process – PPM by volume, dry bases, and boilers – Lbs. /Million BTU heat input

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NON-TITLE V PERMIT APPLICATION
EMISSION POINT DESCRIPTION

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GENERAL IDENTIFICATION AND DESCRIPTION

1. Organization's legal name and SOS control number [as registered with the TN Secretary of State (SOS)]
Sterilization Services of Tennessee - SOS# 029-949

2. Unique Source ID (name/number/letter which uniquely identifies this air contaminant source, like Boiler #1)

3. Unique Emission Point ID (name/number/letter which uniquely identifies this emission point, like Stack #1)
EP2- Dry Bed Reactor Stack #2

4. Brief description of air contaminant source (Attach a diagram if appropriate):
See attachment B - EO gas removed from the chambers is vented to wet acid scrubber whose output is further vented to a dry bed reactor. The output of the dry bed reactor is vented to EP1 - Scrubber Stack #1

5. Emission point location	Latitude	Longitude	**6. Distance to nearest property line (Ft.)**
	35 deg, 02 min, 04 sec	89 deg, 55 min, 09 sec	not yet known but approximately 200 ft

STACK AND EMISSION DATA

7. Stack or emission point data: →	Height above grade (Ft.)	Diameter (Ft.)	Temperature (°F)	% of time over 125°F	Direction of exit (Up, down or horizontal)
	75	0.5	120	0	Up

Data at exit conditions: →	Flow (actual $Ft.^3$/Min.)	Velocity (Ft. /Sec.)	Moisture ($Grains/Ft.^3$)	Moisture (Percent)
	2000 expected	40 expected	not yet known	not yet known
Data at standard conditions: →	Flow (Dry std. $Ft.^3$/Min.)	Velocity (Ft. /Sec.)	Moisture ($Grains/Ft.^3$)	Moisture (Percent)
	2000 expected	40 expected	not yet known	not yet known

8. Monitoring device and recording instrument (check all that apply):

Opacity monitor	SO_2 monitor	NO_X monitor	Strip chart	Electronic data logger	Other (specify in comments)	No monitor (none)
☐	☐	☐	☐	☐	☐	☑

9. Control device. Description of proposed monitoring, recordkeeping, and reporting to assure compliance with emission limits. Include operating parameters of control device (flow rate, temperature, pressure drop, etc.).

dry bed temperature

10. Air contaminants. Emission estimates for each air contaminant emitted from this point should be based on stack sampling results or engineering calculations. Calculations should be attached on a separate sheet. (see instructions for more details)

Air contaminants	Average Emissions (Lbs./Hr.)	Maximum Emissions (Lbs./Hr.)	Concen-tration	Average Emissions (Ton/Yr.)	Potential Emissions (Ton/Yr.)	Emissions Estimation Method Code *	Control Devices *	Control Effi-ciency %
Particulate matter (PM)			**					
Sulfur dioxide (SO_2)			***					
Carbon monoxide (CO)			PPM					
Volatile organic compounds (VOC)			PPM					
Nitrogen oxides (NO_X)			PPM					
Hydrogen fluoride (HF)								
Hydrogen chloride (HCl)								
Lead (Pb)								
Greenhouse gases (CO_2 equivalents)								
Hazardous air pollutant (specify) ethylene oxide	0.005	0.015		0.02	0.06	2	051	99
Hazardous air pollutant (specify)								
Hazardous air pollutant (specify)								
Hazardous air pollutant (specify)								
Hazardous air pollutant (specify)								
Other (specify)								
Other (specify)								
Other (specify)								
Other (specify)								

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12. Signature		**Date** 6/4/2019
Signer's name (type or print)	**Title**	**Phone number with area code**

* Refer to the tables in the instructions for estimation method and control device codes.

** Exit gas particulate matter concentration units: Process – Grains/Dry Standard Ft^3 (70^0F), Wood fired boilers - Grains/Dry Standard Ft^3 (70^0F), all other boilers – Lbs. /Million BTU heat input.

*** Exit gas sulfur dioxide concentrations units: Process – PPM by volume, dry bases, and boilers – Lbs. /Million BTU heat input

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NON-TITLE V PERMIT APPLICATION
EMISSION POINT DESCRIPTION

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GENERAL IDENTIFICATION AND DESCRIPTION

1. Organization's legal name and SOS control number [as registered with the TN Secretary of State (SOS)]
Sterilization Services of Tennessee - SOS# 029-949

2. Unique Source ID (name/number/letter which uniquely identifies this air contaminant source, like Boiler #1)

3. Unique Emission Point ID (name/number/letter which uniquely identifies this emission point, like Stack #1)
EP3 - Dry Bed Reactor Stack #3

4. Brief description of air contaminant source (Attach a diagram if appropriate):
See attachment B - EO gas removed from the chambers is vented to wet acid scrubber whose output is further vented to a dry bed reactor. The output of the dry bed reactor is vented to EP1 - Scrubber Stack #1

5. Emission point location	Latitude	Longitude	**6. Distance to nearest property line (Ft.)**
	35 deg, 02 min, 04 sec	89 deg, 55 min, 09 sec	not yet known but approximately 200 ft

STACK AND EMISSION DATA

7. Stack or emission point data: →	Height above grade (Ft.)	Diameter (Ft.)	Temperature (°F)	% of time over 125°F	Direction of exit (Up, down or horizontal)
	75	0.5	120	0	Up

Data at exit conditions: →	Flow (actual $Ft.^3$/Min.)	Velocity (Ft. /Sec.)	Moisture ($Grains/Ft.^3$)	Moisture (Percent)
	2000 expected	40 expected	not yet known	not yet known
Data at standard conditions: →	Flow (Dry std. $Ft.^3$/Min.)	Velocity (Ft. /Sec.)	Moisture ($Grains/Ft.^3$)	Moisture (Percent)
	2000 expected	40 expected	not yet known	not yet known

8. Monitoring device and recording instrument (check all that apply):

Opacity monitor	SO_2 monitor	NO_X monitor	Strip chart	Electronic data logger	Other (specify in comments)	No monitor (none)
☐	☐	☐	☐	☐	☐	☑

9. Control device. Description of proposed monitoring, recordkeeping, and reporting to assure compliance with emission limits. Include operating parameters of control device (flow rate, temperature, pressure drop, etc.).

dry bed temperature

10. Air contaminants. Emission estimates for each air contaminant emitted from this point should be based on stack sampling results or engineering calculations. Calculations should be attached on a separate sheet. (see instructions for more details)

Air contaminants	Average Emissions (Lbs./Hr.)	Maximum Emissions (Lbs./Hr.)	Concen-tration	Average Emissions (Ton/Yr.)	Potential Emissions (Ton/Yr.)	Emissions Estimation Method Code *	Control Devices *	Control Effi-ciency %
Particulate matter (PM)			**					
Sulfur dioxide (SO_2)			***					
Carbon monoxide (CO)			PPM					
Volatile organic compounds (VOC)			PPM					
Nitrogen oxides (NO_X)			PPM					
Hydrogen fluoride (HF)								
Hydrogen chloride (HCl)								
Lead (Pb)								
Greenhouse gases (CO_2 equivalents)								
Hazardous air pollutant (specify) ethylene oxide	0.005	0.015		0.02	0.06	2	051	99
Hazardous air pollutant (specify)								
Hazardous air pollutant (specify)								
Hazardous air pollutant (specify)								
Hazardous air pollutant (specify)								
Other (specify)								
Other (specify)								
Other (specify)								
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* Refer to the tables in the instructions for estimation method and control device codes.

** Exit gas particulate matter concentration units: Process – Grains/Dry Standard Ft^3 (70^0F), Wood fired boilers - Grains/Dry Standard Ft^3 (70^0F), all other boilers – Lbs. /Million BTU heat input.

*** Exit gas sulfur dioxide concentrations units: Process – PPM by volume, dry bases, and boilers – Lbs. /Million BTU heat input

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NON-TITLE V PERMIT APPLICATION
EMISSION POINT DESCRIPTION

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GENERAL IDENTIFICATION AND DESCRIPTION

1. Organization's legal name and SOS control number [as registered with the TN Secretary of State (SOS)]
Sterilization Services of Tennessee - SOS# 029-949

2. Unique Source ID (name/number/letter which uniquely identifies this air contaminant source, like Boiler #1)

3. Unique Emission Point ID (name/number/letter which uniquely identifies this emission point, like Stack #1)
EP4- Dry Bed Reactor Stack #4

4. Brief description of air contaminant source (Attach a diagram if appropriate):
See attachment B - EO gas removed from the chambers is vented to wet acid scrubber whose output is further vented to a dry bed reactor. The output of the dry bed reactor is vented to EP1 - Scrubber Stack #1

5. Emission point location	Latitude	Longitude	**6. Distance to nearest property line (Ft.)**
	35 deg, 02 min, 04 sec	89 deg, 55 min, 09 sec	not yet known but approximately 200 ft

STACK AND EMISSION DATA

7. Stack or emission point data: →	Height above grade (Ft.)	Diameter (Ft.)	Temperature (°F)	% of time over 125°F	Direction of exit (Up, down or horizontal)
	75	0.5	120	0	Up

	Flow (actual $Ft.^3$/Min.)	Velocity (Ft. /Sec.)	Moisture ($Grains/Ft.^3$)	Moisture (Percent)
Data at exit conditions: →	2000 expected	40 expected	not yet known	not yet known
Data at standard conditions: →	Flow (Dry std. $Ft.^3$/Min.) 2000 expected	Velocity (Ft. /Sec.) 40 expected	Moisture ($Grains/Ft.^3$) not yet known	Moisture (Percent) not yet known

8. Monitoring device and recording instrument (check all that apply):

Opacity monitor	SO_2 monitor	NO_X monitor	Strip chart	Electronic data logger	Other (specify in comments)	No monitor (none)
☐	☐	☐	☐	☐	☐	☑

9. Control device. Description of proposed monitoring, recordkeeping, and reporting to assure compliance with emission limits. Include operating parameters of control device (flow rate, temperature, pressure drop, etc.).

dry bed temperature

10. Air contaminants. Emission estimates for each air contaminant emitted from this point should be based on stack sampling results or engineering calculations. Calculations should be attached on a separate sheet. (see instructions for more details)

Air contaminants	Average Emissions (Lbs./Hr.)	Maximum Emissions (Lbs./Hr.)	Concen-tration	Average Emissions (Ton/Yr.)	Potential Emissions (Ton/Yr.)	Emissions Estimation Method Code *	Control Devices *	Control Effi-ciency %
Particulate matter (PM)			**					
Sulfur dioxide (SO_2)			***					
Carbon monoxide (CO)			PPM					
Volatile organic compounds (VOC)			PPM					
Nitrogen oxides (NO_X)			PPM					
Hydrogen fluoride (HF)								
Hydrogen chloride (HCl)								
Lead (Pb)								
Greenhouse gases (CO_2 equivalents)								
Hazardous air pollutant (specify) ethylene oxide	0.001	0.003		0.004	0.012	2	051	99
Hazardous air pollutant (specify)								
Hazardous air pollutant (specify)								
Hazardous air pollutant (specify)								
Hazardous air pollutant (specify)								
Other (specify)								
Other (specify)								
Other (specify)								
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* Refer to the tables in the instructions for estimation method and control device codes.

** Exit gas particulate matter concentration units: Process – Grains/Dry Standard Ft^3 (70^0F), Wood fired boilers - Grains/Dry Standard Ft^3 (70^0F), all other boilers – Lbs. /Million BTU heat input.

*** Exit gas sulfur dioxide concentrations units: Process – PPM by volume, dry bases, and boilers – Lbs. /Million BTU heat input

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Type or print and submit for each stack or air contaminant source. Submit with the APC 100.

GENERAL IDENTIFICATION AND DESCRIPTION

1. Organization's legal name and SOS control number [as registered with the TN Secretary of State (SOS)]
Sterilization Services of Tennessee - SOS# 029-949

2. Unique Source ID (name/number/letter which uniquely identifies this air contaminant source, like Boiler #1)

3. Unique Emission Point ID (name/number/letter which uniquely identifies this emission point, like Stack #1)
EP5 - Oxidizer Stack #4

4. Brief description of air contaminant source (Attach a diagram if appropriate):
See attachment B - EO gas removed from the chambers is vented to wet acid scrubber whose output is further vented to a dry bed reactor. The output of the dry bed reactor is vented to EP1 - Scrubber Stack #1

5. Emission point location	Latitude	Longitude	**6. Distance to nearest property line (Ft.)**
	35 deg, 02 min, 04 sec	89 deg, 55 min, 09 sec	not yet known but approximately 200 ft

STACK AND EMISSION DATA

7. Stack or emission point data: →	Height above grade (Ft.)	Diameter (Ft.)	Temperature (°F)	% of time over 125°F	Direction of exit (Up, down or horizontal)
	45	2.5	240	100	Up

Data at exit conditions: →	Flow (actual $Ft.^3$/Min.)	Velocity (Ft. /Sec.)	Moisture ($Grains/Ft.^3$)	Moisture (Percent)
	8000 expected	35 expected	not yet known	not yet known
Data at standard conditions: →	Flow (Dry std. $Ft.^3$/Min.)	Velocity (Ft. /Sec.)	Moisture ($Grains/Ft.^3$)	Moisture (Percent)
	8000 expected	35 expected	not yet known	not yet known

8. Monitoring device and recording instrument (check all that apply):

Opacity monitor	SO_2 monitor	NO_X monitor	Strip chart	Electronic data logger	Other (specify in comments)	No monitor (none)
☐	☐	☐	☐	☐	☐	☑

9. Control device. Description of proposed monitoring, recordkeeping, and reporting to assure compliance with emission limits. Include operating parameters of control device (flow rate, temperature, pressure drop, etc.).

Outlet temperature
Catalyst bed temperature

10. Air contaminants. Emission estimates for each air contaminant emitted from this point should be based on stack sampling results or engineering calculations. Calculations should be attached on a separate sheet. (see instructions for more details)

Air contaminants	Average Emissions (Lbs./Hr.)	Maximum Emissions (Lbs./Hr.)	Concen-tration	Average Emissions (Ton/Yr.)	Potential Emissions (Ton/Yr.)	Emissions Estimation Method Code *	Control Devices *	Control Effi-ciency %
Particulate matter (PM)			**					
Sulfur dioxide (SO_2)			***					
Carbon monoxide (CO)			PPM					
Volatile organic compounds (VOC)			PPM					
Nitrogen oxides (NO_X)			PPM					
Hydrogen fluoride (HF)								
Hydrogen chloride (HCl)								
Lead (Pb)								
Greenhouse gases (CO_2 equivalents)								
Hazardous air pollutant (specify) ethylene oxide	0.04	0.04		0.18	0.36	2	019 or 039 ?	99
Hazardous air pollutant (specify)								
Hazardous air pollutant (specify)								
Hazardous air pollutant (specify)								
Hazardous air pollutant (specify)								
Other (specify)								
Other (specify)								
Other (specify)								
Other (specify)								

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* Refer to the tables in the instructions for estimation method and control device codes.

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*** Exit gas sulfur dioxide concentrations units: Process – PPM by volume, dry bases, and boilers – Lbs. /Million BTU heat input

Attachment A

Ethylene Oxide Gas Sterilization Process Description

The gas sterilization process introduces Ethylene Oxide (EtO) gas, under vacuum, into a sealed chamber that contains packaged products to be sterilized. The products are typically pre-humidified, generally at elevated temperatures, prior to the introduction of EtO into the evacuated chamber. The products to be sterilized are enclosed in gas permeable packaging and are exposed to the EtO for controlled periods of time that are known to destroy any biological contaminants that may have become part of the product or product packaging. A graphical depiction indicating the flow of EtO in a typical gas sterilization process is shown below in Figure 1. Arrows indicate the flow or movement of EtO through the process. The numbers refer to the descriptive content on the following pages.

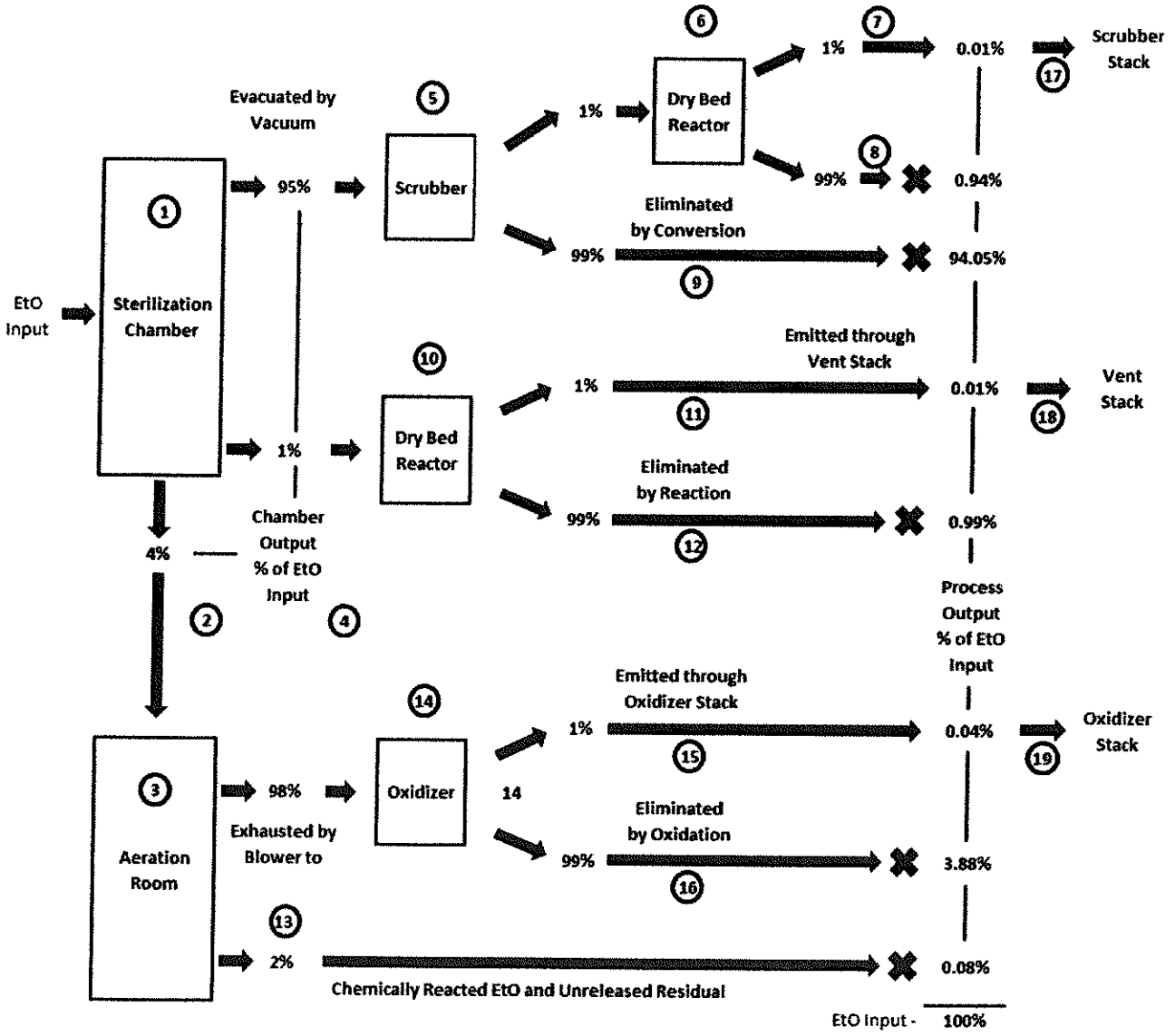

Figure 1 –Ethylene Oxide Gas Sterilization Process

EtO Sterilization

1. Product to be sterilized is loaded into the sterilization chamber. The chamber is evacuated and EtO is introduced into the chamber. Some of the EtO is absorbed by the product or packaging. Most of the EtO is continuously recirculated in the chamber open space. By the end of the sterilization process most of the EtO has been evacuated from the chamber.
2. After the sterilization process is completed, product is removed from the sterilization chamber and transported to aeration rooms.
3. In the aeration room, air is continuously recirculated around the product as it continues to outgas absorbed EtO.
4. Experience indicates that typically no more than 4% of the EtO used is carried with the sterilized product into the aeration room. Typically, at least 95% of the EtO used is evacuated from the chamber to a scrubber during the sterilization process. The rest of the EtO used, typically no more than 1%, remains in the chamber and is vented through a dry bed reactor.

EtO Scrubbing

5. Ethylene Oxide gas that is evacuated from the chamber is sent to a liquid scrubber. The scrubber mixes the EtO with an acid/water solution. This converts the EtO gas to liquid Ethylene Glycol. The scrubbing process is designed to be at least 99% efficient in converting the EtO gas to Ethylene Glycol.
6. No more than 1% of the EtO gas processed by the scrubber is vented to a dry bed reactor.
7. No more than 1% of the EtO gas vented to the dry bed reactor is emitted to the atmosphere through the scrubber stack.
8. At least 99% of the EtO gas vented to the dry bed reactor is eliminated through a reaction that converts the gas to a disposable polymer
9. At least 99% of the EtO gas processed by the scrubber is eliminated through conversion to Ethylene Glycol.

EtO Ventilation

10. The relatively small amount of EtO left in the chamber after sterilization, already stated as typically not more than 1%, is vented to a dry bed reactor.
11. No more than 1% of the EtO processed by the dry bed reactor is emitted to the atmosphere through the vent stack.
12. At least 99% of the EtO gas processed by the dry bed reactor is eliminated through a reaction that converts the gas to a disposable polymer.

EtO Oxidation

13. Product outgassing of EtO continues in the aeration room. Air is continuously recirculated around the sterilized product. A portion of the recirculating air, containing outgassed EtO, is continuously removed from the aeration room by exhaust blowers. Studies and experience suggest that about 98% of the residual EtO carried in the product and packaging is released during the aeration process and is processed by an oxidizer. Typically, this results in less than 2% remaining in the sterilized product as chemically reacted or unreleased residual EtO.

14. Ethylene oxide gas that is exhausted from the aeration room is vented to a thermal oxidizer. The thermal oxidizer is designed to be at least 99% efficient in eliminating EtO gas through combustion.
15. No more than 1% of the EtO gas processed by the oxidizer is emitted to the atmosphere through the oxidizer stack.
16. At least 99% of the EtO gas processed by the oxidizer is eliminated through the oxidation process.

EtO Emissions

17. Typically, about 0.95% of the EtO used by the process is emitted through the Scrubber Stack. This is calculated as no more than 1% (after scrubbing) of 95% (after sterilizing) of the EtO used in the sterilization process.
18. Typically, about 0.01% of the EtO used by the process is emitted through the Vent Stack. This is calculated as no more than 1% (after reaction) of 1% (after sterilizing) of the EtO gas used in the sterilizing process.
19. Typically, about 0.04% of the EtO used by the process is emitted through the Oxidizer Stack. This is calculated as no more than 1% (after oxidizing) of 98% (after aeration) of 4% (after sterilization) of the EtO used in the sterilization process.

Attachment B

Block Diagram with Ethylene Oxide Rates